

REMARKS

Claims 2, 8, 14-17, 29, 30, 31, and 40 have been rejected. Claims 1, 2, 8, 14, 15, 16, 17, 29, 30, 31, and 40 have been amended. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

Rejection of Claims 2, 8, 14-17, 29, 30, 31, 40 Under 35 U.S.C. 112:

Claims 2, 8, 14-17, 29, 30, 31, 40 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner points to the following deficiencies in Claim 1: in line 8 “the term “ring” is unclear whether it is referred to a “phenolic ring” of the thermal solvent compound or otherwise; in line 9, the parenthesis associated with “(acyl)” should be removed. The Examiner states that in Claim 2, page 117, the term “ring” is unclear whether it is referred to a “phenolic ring” of the thermal solvent compound or otherwise; in Claim 8, antecedent basis is lacking for the term “melt former”; and in Claims 14-15, containing the term “consisting of” both claims requires the term “and” before the last claimed compound; in claim 16, the use of the term “preferably” on page 122 line 20; page 123, lines 5-6 renders the claim unclear whether the non-preferred range is included; in line 19 the language “at least one C1 to C10 organic group” is indefinite; in line 25, the term “the heteroaromatic” is indefinite; in line 13, there is no antecedent basis for the term “the blocking group”; the term “such as” associated with “phenyl and naphthyl” or “including” in line 7 render the scope of protection sought for cycloalkyl and aryl unclear. The Examiner states, with respect to Claim 17, that the term “D_p” is not defined; therefore, it is indefinite; in Claim 29, the Roman numeral I should place between parentheses; and in Claim 30, the term “ring” is unclear whether it is referred to a “phenolic ring” of the thermal solvent compound or otherwise; in Claim 31, the term “D_p” is not defined; therefore, it is indefinite. The Examiner further states that Claim 40 is unclear as to which image is to be used in printing; and the scope of protection sought for processing steps since the printing technologies recited therein fails to clearly define means to perform the claimed process.

The above amendments to claims 1, 2, 8, 14, 14, 16, 17, 29, 30, 31 and 40 are believed to correct the deficiencies pointed out by the Examiner.

Rejection of Claims 1-15, 17, 23-35, 41-44 Under 35 U.S.C. 103(a):

Claims 1-15, 17, 23-35, 41-44 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (Sato) in view of Bailey et al ('109) and Hansch et al (Hansch). The Examiner states that Sato discloses a color photothermographic material substantially as claimed, noting especially the developing agent of compound (Z) in the abstract. The Examiner states that this developing agent is considered as a blocked developer in the meaning of the present claimed invention, since this developer reveals development activity by eliminating a protective group from the precursor during heat development (column 13, lines 55-65). The Examiner states, referring to column 21 at lines 48-63, that the use of hydrophilic thermal solvent amides, imides and alcohol are disclosed to accelerate the transfer of dyes, and that Bailey et al. discloses a thermal solvent useful in heat developable material. The Examiner states that this thermal solvent improves dye transfer efficiency which enable photographic element to be constructed using less incorporated chemistry and therefore lower manufacturing cost. The Examiner notes especially compound in the column 4 formula (I) and its advantage in column 4 lines 40-45. The Examiner states that the compound of formula (I) contains Z1 to Z5 as substituents wherein the sum of Hammett sigma parameter is of at least -0.28 and less than 1.53, and the substituents having sigma value within the teaching of Bailey has been known in Hansch.

Regarding Sato et al, the Examiner concedes that Sato et al fails to disclose the thermal solvent having the specific structure presented in the present claimed invention. The Examiner, however, states that it would have been obvious to the worker of ordinary skill in the art at the time the invention was made to use a thermal solvent taught in Bailey in the material of Sato to its improve dye transfer efficiency which enable photographic element to be constructed using less incorporated chemistry and therefore lower manufacturing cost.

This rejection is respectfully traversed. The technology disclosed by Bailey et al was intended for Kodak Ektacolor color paper so that it would not

be necessary to bleach and fix the paper during photoprocessing, thus reducing the quantities of processing solutions. Thus, Bailey et al uses an aqueous developer and the development by the developer is conventional. When the dye is formed, the thermal solvent is there to promote diffusion (diffusion transfer) to a receiving layer.

In contrast, the presently amended claims are directed to an invention the purpose of which is to solve a major problem in dry color photothermographic systems, wherein the dye images require the reaction of a blocked developer and a dye-forming coupler through substantially dry gelatin or the like. In particular, the invention provides a color photothermographic element comprising silver halide, a blocked developing agent, at least one coupler that forms an image dye upon reaction of said compound with the oxidation product of the unblocked developing agent, a hydrophilic binder such as gelatin, and a thermal solvent. Applicants have not invented the compound per se, but only its use in color photothermographic systems to solve a major problem, one that has prevented any commercialization of a non-dye-diffusion color photothermographic system for consumer use.

The claims have been amended to clarify the invention. As indicated above, Bailey et al. is directed to a photographic paper rather than a photographic film, and the subject of this patent is a color paper that does not require bleaching or fixing, so that it is processable without large quantities of solutions. As mentioned in the present specification, Bailey et al. disclose the use of phenolic compounds (hydroxybenzene derivatives) for forming an improved dye image in an aqueous developable photographic dry dye-diffusion transfer element. A color coupler forms or releases a heat-transferable dye upon reaction of the coupler with the oxidation product of a primary amine developing agent. A dye receiving layer is placed in physical contact with the dye-diffusion transfer element and then combination heated to effect dye-diffusion. Thus, the phenol compounds used by Bailey et al. are not used as thermal solvents. This is made clear, in col. 11, lines 42 to 68, of the '109 patent, where it is stated as follows:

Thermal solvents and heat solvents of the type disclosed in the aforesaid US patent documents are included to facilitate heat development and

thermal dye transfer. The preferred solvents of the present invention serve to facilitate the thermal dye transfer of dyes through the binder of the receiver element.

Thus, Bailey et al. actually teaches other, conventional compounds for use as thermal solvents. As mentioned above, the independent claims have been amended to exclude thermal dye transfer, as clearly supported by the specification. Regarding the method claim, the film of the present invention is scanned, thus inherently excluding the use of dye transfer receiving layer.

Rejection of Claims 1-44 Under 35 U.S.C. 103(a):

Claims 1-44 have been rejected under 35 U.S.C. 103(a) as being unpatentable over EP1113316 (EP'316) in view of Bailey et al ('109) and Hansch. The Examiner states that EP'316 discloses a color photothermographic material and process substantially as claimed, except for the use of thermal solvent having chemical structure presented in the claimed invention, noting for instance that material on pages 52-55, example 7; the process shown in Figs 1-2, and the developers on pages 12-21. The Examiner states that Bailey et al discloses a thermal solvent useful in heat developable material, and this thermal solvent improves dye transfer efficiency which enable a photographic element to be constructed using less incorporated chemistry and to, therefore, lower manufacturing cost. The Examiner notes especially compound in the column 4 formula (I) and its advantage in column 4 lines 40-45, where the compound of formula (I) contains Z1 to Z5 as substituents wherein the sum of Hammet sigma parameter is of at least -0.28 and less than 1.53. The Examiner states that the substituents have a sigma value within the teaching of Bailey, as shown by Hansch. The Examiner states that it would have been obvious to the worker of ordinary skill in the art at the time the invention was made to use a thermal solvent taught in Bailey in the material of EP'316 to its improve dye transfer efficiency which enable photographic element to be constructed using less incorporated chemistry and therefore lower manufacturing cost.

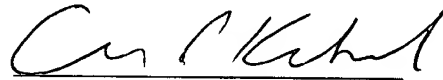
This rejection is respectfully traversed. This rejection is based on the assumption that Bailer et al. discloses or teaches the use of the compound used in the present invention as a thermal solvent. As explained above with respect to

Bailey et al., Bailey's compound is not used as a thermal solvent for development, but rather Bailey et al. specifically teaches other conventional compounds for use as a thermal solvent.

It is believed that the foregoing is a complete response to the Office Action and that the claims are in condition for allowance. Favorable reconsideration and early passage to issue is therefore earnestly solicited.

Attached hereto is a marked up version of the changes made to the claims by the current amendment. The attached page(s) is captioned "Version With Markings To Show Changes Made."

Respectfully submitted,



Attorney for Applicants
Registration No. 30,721

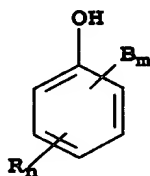
Chris P. Konkol/amb
Rochester, NY 14650
Telephone: (585) 722-0452
Facsimile: (585) 477-1148

Version With Markings To Show Changes Made

In the Claims:

Please amend Claims 1, 2, 8, 14, 15, 16, 17, 29, 30, 31, and 40 as set forth below:

-- 1. (Once Amended) A color photothermographic element that is a photographic film comprising at least three light-sensitive units which have their individual sensitivities in different wavelength regions, each of the units comprising at least one light-sensitive silver-halide emulsion, binder, and dye-providing coupler, and a blocked developer in the presence of an effective amount of a thermal solvent for promoting development in a dry or substantially dry process in the absence of thermal dye transfer, which thermal solvent comprises a phenolic ring and is represented by the following structure



wherein the substituent B is independently selected from a substituent where an oxygen, carbon, nitrogen phosphorus or sulfur atom is linked to the phenolic ring as part of an ester, amido, ether, aminosulfonyl, sulfamoyl, carbonyl, (acyl) or sulfonyl group;

m is 0 to 4; and

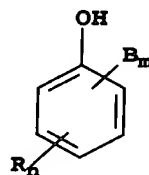
wherein the substituent R is independently selected from a substituted or unsubstituted alkyl, cycloalkyl, aryl, alkylaryl, or forms a ring with another substituent on the ring;

n is 0 to 4; and

wherein m+n is 1 to 5.

2. (Once Amended) A color photothermographic element that is photographic film comprising at least three light-sensitive units which have their individual sensitivities in different wavelength regions, each of the units comprising at least one light-sensitive silver-halide emulsion, binder, and dye-

providing coupler, and a blocked developer in the presence of a thermal solvent
for promoting development in a dry or substantially dry process in the absence of
thermal dye transfer, which thermal solvent ~~having~~ has a melting point of at least
 80°C, comprises a phenolic ring and is represented by the following structure



wherein the substituent B is independently selected from a substituent where an oxygen, carbon, nitrogen, phosphorus or sulfur atom is linked to the phenolic ring as part

of a ketone, aldehyde, ester, amido, carbamate, ether, aminosulfonyl, sulfamoyl, sulfonyl, amine, phosphine, or aromatic heterocyclic group;

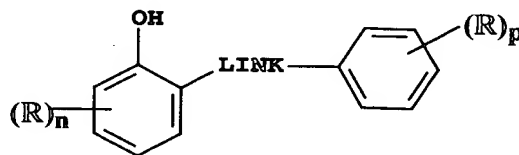
m is 0 to 4; and

wherein the substituent R is independently selected from a substituted or unsubstituted alkyl, cycloalkyl, aryl, alkylaryl, or forms a ring with another substituent on the ring;

n is 0 to 4; and

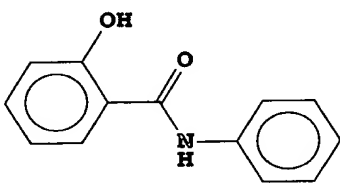
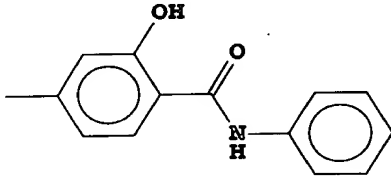
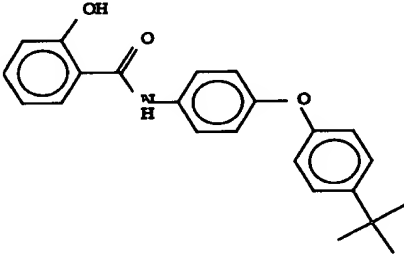
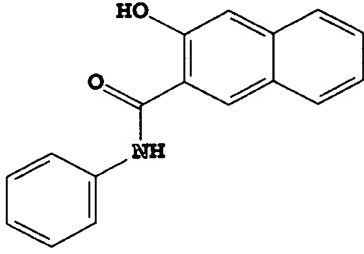
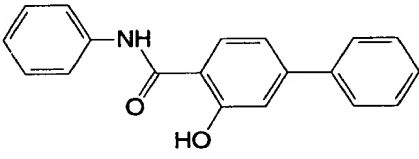
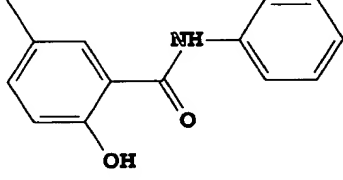
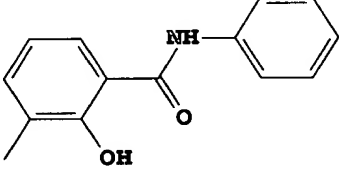
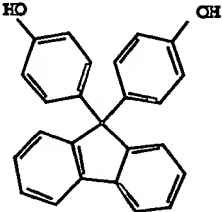
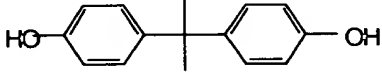
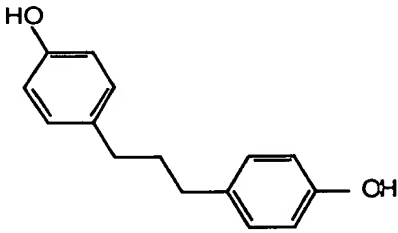
wherein m+n is 1 to 5.

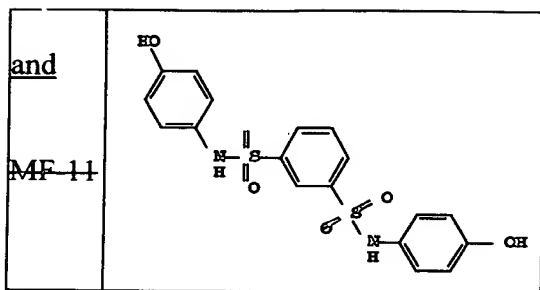
8. (Once Amended) The color photothermographic element of claim 2 wherein the ~~melt-former~~ thermal solvent has the following structure:



wherein LINK is selected from the group consisting of -C(=O)NH-, -NHC(=O)-, -NH₂SO₂-, -C(=O)-, -C(=O)O-, -O(R³)-, -SO₂NH-, and -SO₂-; where R³ is an alkyl group and R and n is as defined above; and p is 0 to 4.

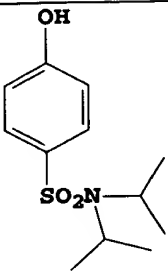
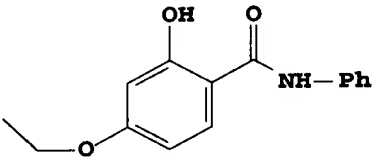
14. (Once Amended) The photothermographic element of claim 3 wherein the thermal solvent is selected from the group consisting of:

MF-1		MF-2	
MF-3		MF-4	
MF-5		MF-6	
MF-7		MF-8	
MF-9		MF-10	

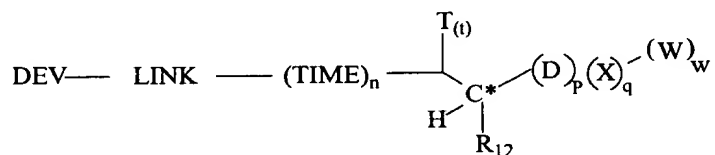


15. (Once Amended) The photothermographic element of claim 2 wherein the thermal solvent is selected from the group consisting of:

MF12		MF13	
MF15			
MF16		MF17	
MF18		MF19	
MF20			

	
MF22 and	

16. (Once Amended) A color photothermographic element according to claim 1, wherein the blocked developer is a compound represented by the following structure:



wherein:

DEV is a developing agent;

LINK is a linking group;

TIME is a timing group;

n is 0, 1, or 2;

t is 0, 1, or 2, and when t is not 2, the necessary number of hydrogens (2-t) are present in the structure;

C* is tetrahedral (sp³ hybridized) carbon;

p is 0 or 1;

q is 0 or 1;

w is 0 or 1;

$p + q = 1$ and when p is 1, q and w are both 0; when q is 1, then w is 1;

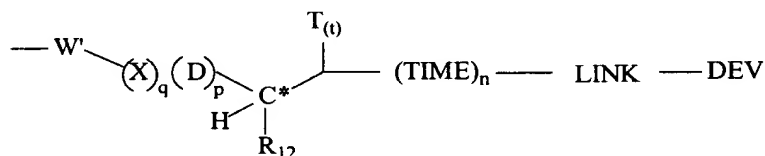
R_{12} is hydrogen, or a substituted or unsubstituted alkyl, cycloalkyl, aryl or heterocyclic group or R_{12} can combine with W to form a ring;

T is independently selected from a substituted or unsubstituted (referring to the following T groups) alkyl group, cycloalkyl group, aryl, or heterocyclic group, an inorganic monovalent electron withdrawing group, or an inorganic divalent electron withdrawing group capped with at least one C1 to C10 organic group ~~(that is either an R_{13} or an R_{13} and R_{14} group), preferably capped with a substituted or unsubstituted alkyl or aryl group~~; or T is joined with W or R_{12} to form a ring; or two T groups can combine to form a ring;

D is a first activating group selected from substituted or unsubstituted (referring to the following D groups) heteroaromatic group or aryl group or monovalent electron withdrawing group, wherein ~~the~~the said heteroaromatic group can optionally form a ring with T or R_{12} ;

X is a second activating group and is a divalent electron withdrawing group;

W is W' or a group represented by the following structure:



W' is independently selected from a substituted or unsubstituted (referring to the following W' groups) alkyl ~~(preferably containing 1 to 6 carbon atoms)~~, cycloalkyl ~~(including bicycloalkyls, but preferably containing 4 to 6 carbon atoms)~~, aryl ~~(such as phenyl or naphthyl)~~ or heterocyclic group; and wherein W' in combination with T or R_{12} can form a ring;

R_{13} , R_{14} , R_{15} , and R_{16} can independently be selected from substituted or unsubstituted alkyl, aryl, or heterocyclic group;

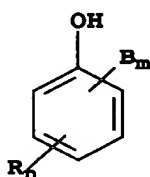
any two members of the following set: R_{12} , T , and either D or W , that are not directly linked may be joined to form a ring, provided that creation of

the ring will not interfere with the functioning of ~~the~~ a blocking group in the blocked developer;

wherein the T, R₁₂, D, X and W groups are selected such that the blocked developer has a half-life (t_{1/2}) ≤ 20 min, and a peak discrimination, at a temperature of at least 60°C, of at least 2.0.

17. (Once Amended) The photothermographic element of claim 1 wherein ~~D~~ peak discrimination is 3 to 10 and ~~D~~ peak discrimination is at a temperature of 100 to 160°C.

29. (Once Amended) A method of image formation comprising the step of developing an imagewise exposed photothermographic element that is a photographic film comprising at least three light-sensitive units which have their individual sensitivities in different wavelength regions, each of the units comprising at least one light-sensitive silver-halide emulsion, binder, and dye-providing coupler, and a blocked developer having a half-life (t_{1/2}) ≤ 20 min, and a peak discrimination, at a temperature of at least 60°C, of at least 2.0, which blocked developer and coupler is developed in the presence of a thermal solvent for promoting development in a dry or substantially dry process in the absence of thermal dye transfer, which thermal solvent comprises a phenolic ring and ~~hashaving~~ the following formula:



(I)

wherein the substituent B is independently selected from a substituent where an oxygen, carbon, nitrogen phosphorus or sulfur atom is linked to the ring as part of a ketone, aldehyde, ester, amido, carbamate, ether, aminosulfonyl, sulfamoyl, sulfonyl, amine, phosphine, or aromatic heterocyclic group;
m is 0 to 4; and

wherein the substituent R is independently selected from a substituted or unsubstituted alkyl, cycloalkyl, aryl, alkylaryl, or forms a ring with another substituent on the ring;

n is 0 to 4; and

wherein m+n is 1 to 5.

30. (Once Amended) The method of claim 29 wherein the substituent B is linked to the phenolic ring as part of an ester, amido, ether, aminosulfonyl, sulfamoyl, sulfonyl or sulfone group;

31. (Once Amended) The method of claim 29 wherein ~~D~~peak discrimination is 3 or greater and ~~D~~peak discrimination is at a temperature of 100 to 160°C.

40. (Once Amended) A method according to claim 39, wherein printing the electronic image representation is accomplished with one ~~any~~ of the following ~~printing technologies~~: electrophotography; inkjet; thermal dye sublimation; or CRT or LED printing to sensitized photographic paper.